

Flow Monitoring at Pump Stations: Opportunities and Challenges



Definition of a Pump

A device that raises, transfers or compresses fluids (Webster)

A machine that transfers a volume of liquid from a lower to a higher energy level (literature)

A device that imparts mechanical energy to fluids and causes flow usually to a higher fluid surface level (against gravity).

Discharge Rating Needs for Pumps

The District monitors flows at over 60 pump stations with more coming yearly

Flow data needed for water supply, environmental protection, flood control, ecosystem restoration

Discharge estimation accuracy depends on (main input: stage (u/s, d/s), engine speed)

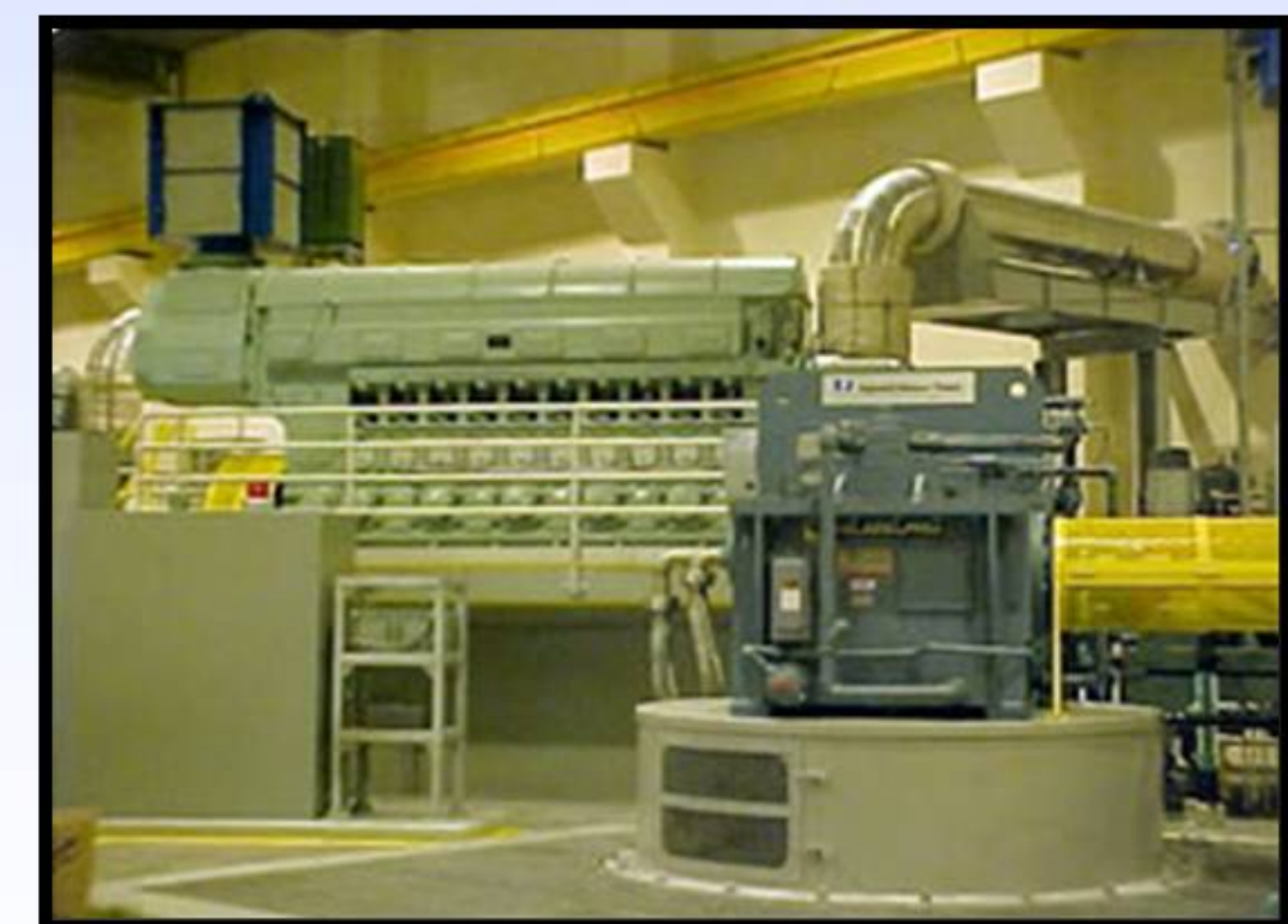
PUMP STATION S135



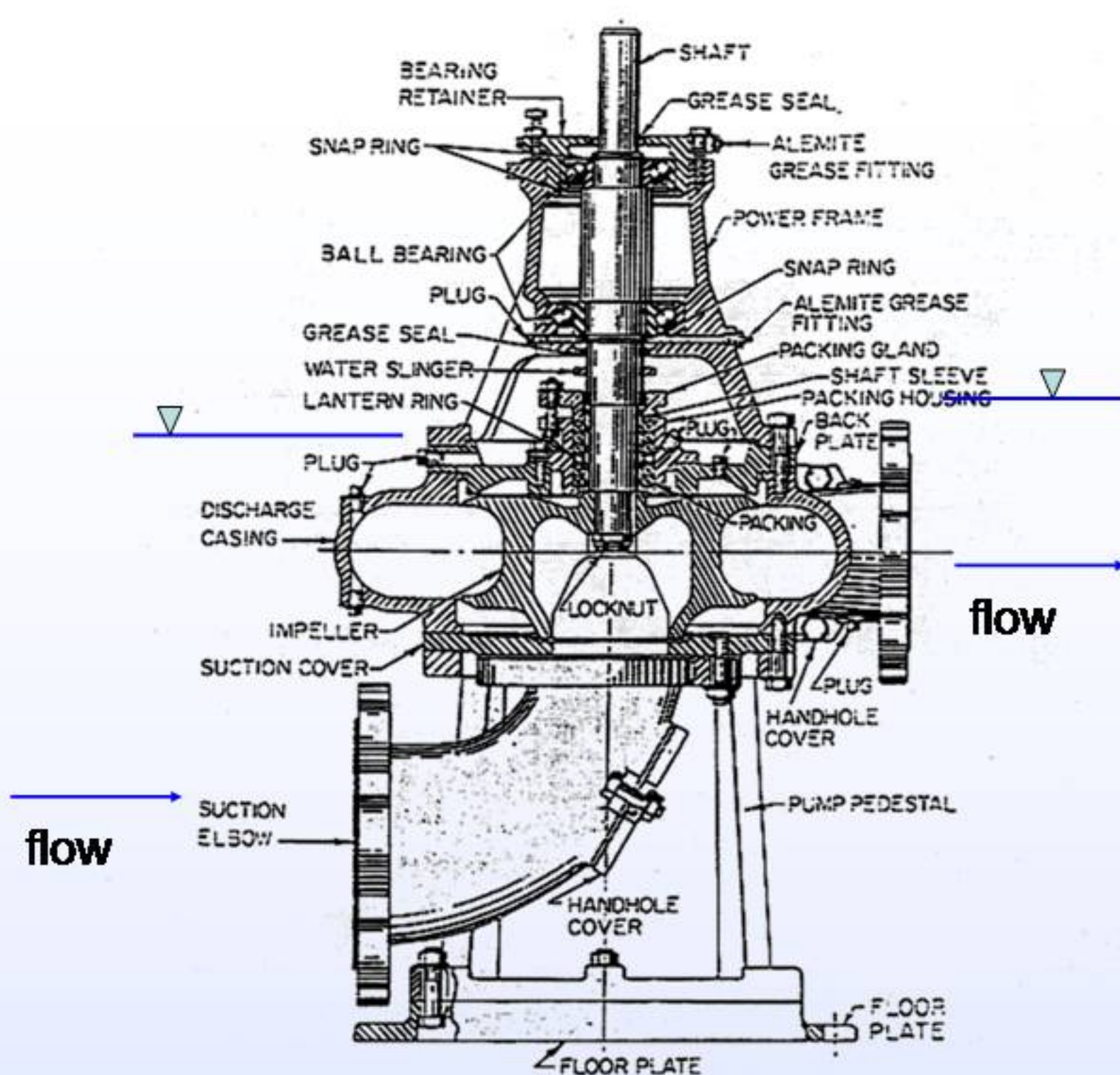
PUMP STATION S5A



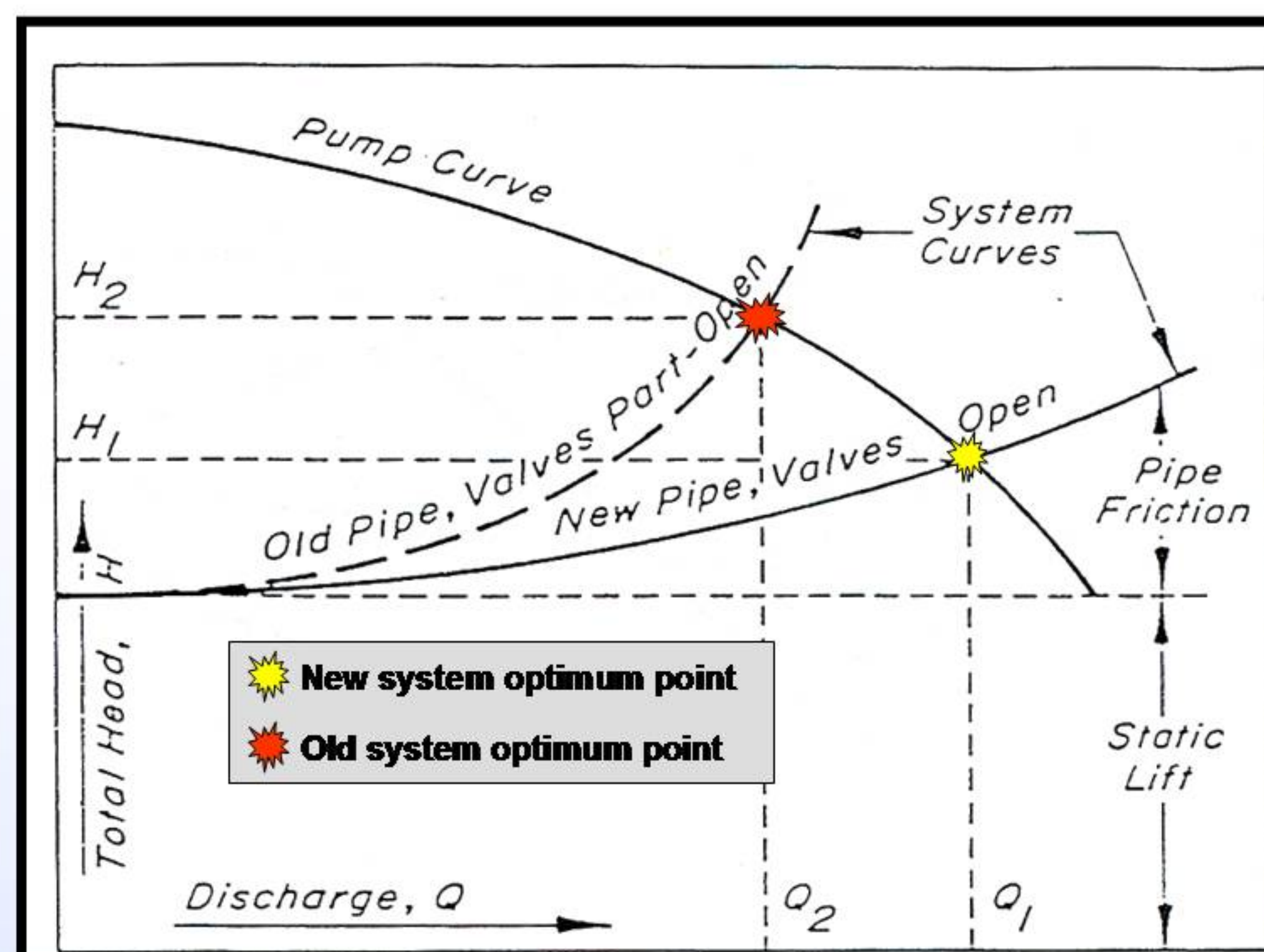
PUMP STATION CONTROLS (INTERIOR)



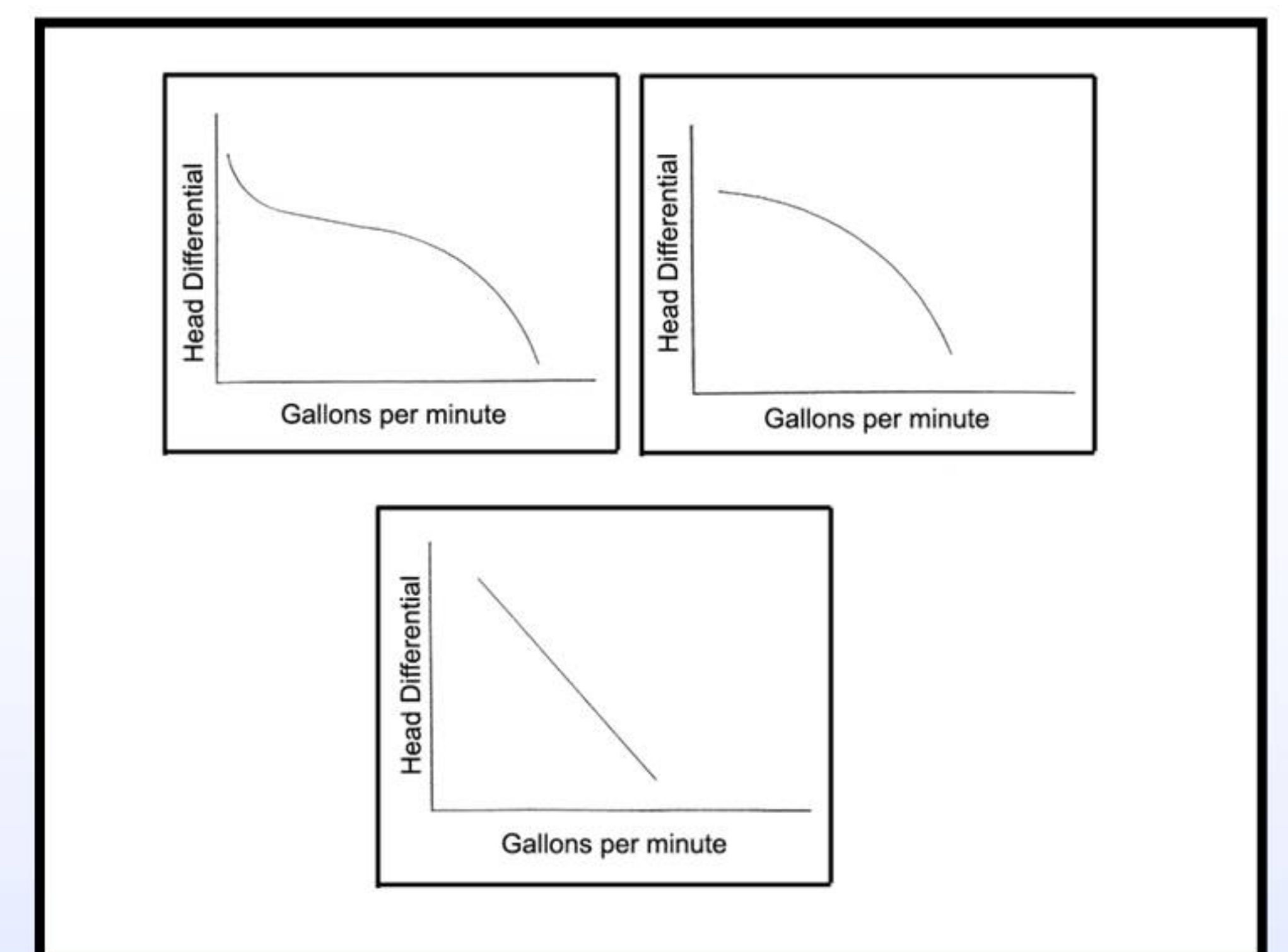
VERTICAL SECTION - TYPICAL



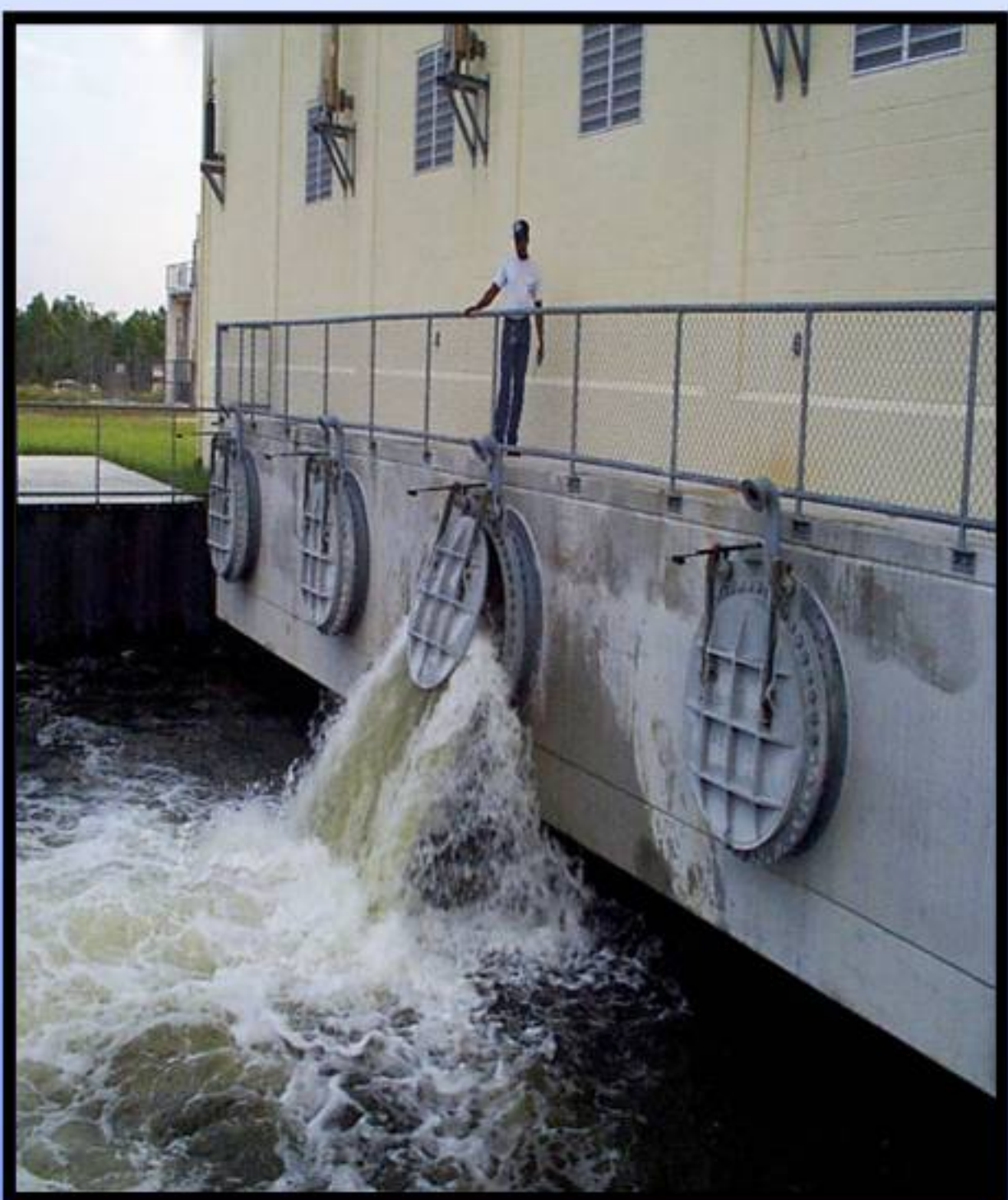
PUMP AND SYSTEM CURVES



ESTIMATION OF FLOW THROUGH PUMPS



WATER SURFACE ELEVATIONS S332D



- Water surface at the outflow discharge point not well defined
- Input inaccuracy causes discharge estimate inaccuracy

SITE LAYOUT ISSUES S332D



- Stream gauging Location problem
- Stage Monitoring Location Problem
- Approach Channel on Bend

SITE LAYOUT ISSUES S332B



- Intake perpendicular to flow
- Not conducive for flow measurement
- Unstable flows occur (spirals and eddies)

RECOMMENDATIONS

Pump sizes must meet high and low flow needs

Pump station designs must facilitate accurate flow estimation

Provisions should be made for accurate flow and good gauging site

Accurate u/s and d/s stage measurement must be provided for

(submergence of intake and discharge pipes at all times, proper location of stilling well)